

Our Docket No.: 42390P9482

Patent

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

re the Patent Application of:

Kumamoto et al.

Serial No.: 09/741,535

Filed: December 19, 2000

For: MOLDED FLIP CHIP PACKAGE

Examiner: Thai, Luan C.

Art Unit: 2827

RESPONSE TO OFFICE ACTION

Box Non-Fee Amendment
Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In response to the Office Action mailed on September 25, 2002, the Applicants respectfully request the Examiner to enter the following amendment and to consider the following remark.

FIRST CLASS CERTIFICATE OF MAILING

I hereby certify that I am causing the above-referenced correspondence to be deposited with the United States Postal Service as first class mail with sufficient postage on the date indicated below and that this paper or fee has been addressed to the Assistant Commissioner for Patents, Washington, D. C. 20231

December 5, 2002

Date of Deposit

Leah Schwenke

Name of Person Mailing Correspondence

Leah Schwenke
Signature

12/5/02
Date

AMENDMENT

Unmarked Version

In the claims:

Please cancel claims 35 and 36.

Presented below are all pending claims.

1. (Three Times Amended) A method comprising:

placing an incomplete chip package into a mold formed by a first portion and a second portion, the incomplete chip package comprising a chip and a substrate electrically coupled using a flip chip process, the mold having an upper inner surface which is coated with release film, and the chip having (i) a top surface facing the substrate, (ii) a bottom surface opposite the top surface, the bottom surface butting against the upper inner surface, and (iii) one or more side surfaces between the top and bottom surfaces;

injecting a liquid resin into a runner section of the mold, the runner formed by mating the first portion with the second portion, and the resin encapsulating a significant portion of the one or more side surfaces, and filling a first gap between the top surface and the adjacent substrate; and

curing the resin.

20. (Three Times Amended) A method comprising:

placing an incomplete flip chip package into a bottom inner cavity of a bottom mold portion, the incomplete flip chip package comprising a chip and a substrate, the chip having a top surface coupled by reflowed solder bumps to an upper surface of the substrate, the chip further comprising a bottom surface opposite the top surface and one or more side surfaces between the top and bottom surfaces;

mating an upper mold portion with the lower mold portion, the upper mold portion having an upper inner cavity, including an upper inner surface which is coated with a release film, and the bottom surface of the chip butts against the upper inner surface, the upper and bottom inner cavities forming a mold inner cavity enclosing the incomplete flip chip package, and forming a runner between the upper and lower mold portions;

injecting a predetermined amount of a liquid resin into the mold inner cavity through the runner, the liquid resin encapsulating substantially all or the one or more side surfaces and substantially all of the upper surface, the liquid resin further filling a gap between the top surface of the chip and an adjacent portion of the upper surface of the substrate, encapsulating the reflowed solder bumps; and

curing the liquid resin by maintaining the mold at an elevated temperature for a predetermined period of time, the elevated temperature being equal to or greater than the cure temperature of the filled liquid resin for the predetermined period of time.

33. The method of claim 1, additionally comprising separating the mold between the upper mold portion and the lower mold portion to expose a molded chip package, the upper mold portion being removed with the release film.
34. The method of claim 20, additionally comprising separating the mold between the upper mold portion and the lower mold portion to expose a molded chip package, the upper mold portion being removed with the release film.

REMARK

Applicant respectfully requests reconsideration of this application as amended. No claims have been added. Claims 1 and 20 have been amended, and claims 35 and 36 have been cancelled. Therefore, claims 1, 20, 30, and 34 are now presented for examination.

U.S.C. §112 Rejections

The Examiner rejected claims 1, 20, and 33-36 under 35 U.S.C. §112 as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, the Examiner stated that the specification as originally filed does not disclose that “the entire length of the upper inner surface of the mold is coated with release film” as recited in claims 1, 20, and 35.

Claim 35 has been cancelled. The Applicant disagrees with the Examiner that the specification as originally filed does not disclose that “the entire length of the upper inner surface of the mold is coated with release film” as recited in claims 1, 20, and 35 because FIG. 2C shows that the upper inner surface 220 has a release film 240 along its entire length. As stated in MPEP 608.04, “In establishing a disclosure, applicant may rely not only on the specification and drawing as filed but also on the original claims if their content justifies it.” Since

FIG. 2C was filed with the original application, and as such, should be considered as part of the disclosure.

At any rate, the Applicant have amended claims 1 and 20, without prejudice, such that these claims do not require release film on the entire length of the upper inner cavity. Furthermore, claim 35 has been cancelled. As such, the Applicant respectfully requests that the Examiner withdraw his rejection of claims 1 and 20.

U.S.C. §112 Rejections

Miyajima-2843 in view of Miyajima-483

The Examiner rejected claims 1, 33, 35 and 36 under 35 U.S.C. §103(a) as being unpatenable over Miyajima (6,187,243 herein after called "Mi-243") in view of Miyajima (6,048,483 herein after called Mi-483).

Neither Miyajima-243 nor Miyajima-483 teaches or discloses, at the least, injecting resin into a runner section to fill the mold cavity, where the runner section is formed by mating the first portion of the mold and the second portion of the mold.

In Miyajima-243 and Miyajima-483, resin is injected into the cavity through a gate 238, where the gate 238 is connected to one corner of the cavity recess, and a resin from the pot 250 is injected into the cavity from the corner of the cavity recess. (See Miyajima-243 FIG. 6 and column 7, lines 42-44; and

Miyajima-483 FIG. 6 and column 9 lines 35-38.) Neither reference shows resin being injected between a section formed from the mating of the upper mold and the lower mold.

Furthermore, Chia does not disclose injecting resin into a runner section to fill the mold cavity, where the runner section is formed by mating the first portion of the mold and the second portion of the mold. In Chia, resin is injected into an opening of a first mold section, rather than an opening formed between a first mold section and second mold section as required by the Applicants' invention as recited by the claims. See FIG. 1 and column 3 lines 60-62.

Conclusion

Applicants respectfully submit that the objection and rejections have been overcome by the Amendment and Remark, and that the claims as amended are now in condition for allowance. Accordingly, Applicants respectfully request the objection and rejections be withdrawn and the claims as amended be allowed.

Invitation for a Telephone Interview

The Examiner is requested to call the undersigned at (303) 740-1980 if there remains any issue with allowance of the case.

Request for an Extension of Time

The Applicants respectfully petition for an extension of time to respond to the outstanding Office Action pursuant to 37 C.F.R. § 1.136(a) should one be necessary. Please charge our Deposit Account No. 02-2666 to cover the necessary fee under 37 C.F.R. § 1.17(a) for such an extension.

Charge our Deposit Account

Please charge any shortage to our Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP

Date: December 5, 2002



Libby H. Hope
Reg. No. 46,774

12400 Wilshire Boulevard
7th Floor
Los Angeles, California 90025-1030
(303) 740-1980
Docket No.: 42390P9482
Application No.: 09/741,535